How our brightest choose their careers:

The career decision-making processes of students with high academic potential

SERAP Number 2011149

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January, 2013

Executive Summary

Introduction

In this study, a number of inter-related models of the cognitive career decision-making processes of intellectually gifted adolescents were theoretically developed and empirically tested. One group of models described the cognitive decision-making processes that lead to intentions to pursue particular occupations or careers, while a second group described the cognitive decision-making making processes associated with occupational or career indecision. Multiple models were investigated as part of a *competing models strategy* to avoid a possible confirmation bias that may exist when testing models in isolation, and to gain better insights into the comparative explanatory power of models. Simultaneously, the study followed a *confirmatory strategy*, as data analysis was carried out over two phases, with the second phase being designed to confirm the models assessed in the first phase.

Data collection and analysis

Data were collected from students attending a total of six academically selective high schools in the greater Sydney metropolitan area. The survey instrument used to collect data included items on the socio-demographic characteristics of the participants, along with 88 Likert-type scale items that were designed to assess the 15 constructs of interest to the study. Six hundred and eighty-seven intellectually gifted adolescents (in Years 9 to 11) attending three schools participated in the first phase of the study, and 664 intellectually gifted adolescents (in Years 9 to 11) attending three schools participated in the second phase. Data analysis included confirmatory factor analysis, structural equation modelling, and qualitative data analysis.

Results and Discussion

The data analysis resulted in the acceptance of two empirically verified and refined models of the cognitive decision-making processes of intellectually gifted adolescents. One related to the cognitive processes leading to intentions to pursue particular occupations/ careers, while the other related to the cognitive processes associated with occupational/career indecision.

Model of cognitive processes leading to intentions to pursue particular careers

The finally accepted cognitive process model of intentions to pursue particular occupations or careers suggested that generally, gifted adolescents who are collectivistic with respect to their families are likely to be substantially influenced by their family members, who may direct them to value interest and enjoyment in occupations. Similarly, gifted adolescents with an individualistic outlook toward the future appear to place substantial importance on interest and/or enjoyment when contemplating their future occupations. In turn, the valuing of interest and enjoyment was found to be a strong and positive predictor of both a need for intellectual stimulation, and the attitudes that high ability adolescents form of occupations, suggesting that intellectually gifted adolescents may find intellectually stimulating occupations to be among the most interesting and enjoyable. In contrast, a need to fulfil one's potential was found to be negatively associated with attitudes toward various occupations, possibly reflecting some resentment toward the substantial and excessive expectations that intellectually gifted adolescents may experience from others in society.

The model suggested that the valuing of interest and enjoyment, and the attitudes of intellectually gifted adolescents toward occupations, may be the constructs that are likely to play pivotal and critical roles in the career decision-making processes of intellectually gifted adolescents. In particular, the prominence given to interest and enjoyment suggests that they may take precedence over all other occupational values, including recognition from others and financial rewards.

A possible implication of the model for practice is that if policymakers, psychologists, career counsellors, and family members wish to encourage the pursuit of certain "desirable" occupations (e.g., occupations that fully utilise the potential of intellectually gifted adolescents, and skilled occupations that are experiencing shortages), it may useful to emphasise the interesting, enjoyable, and intellectually stimulating aspects of these occupations. Moreover, it may be necessary to refrain from any mention of the possibility that such occupations may allow intellectually gifted adolescents to fulfil their potential.

Model of cognitive processes associated with career indecision

The finally accepted cognitive process model relating to occupational/career indecision suggested that intellectually gifted adolescents with individualistic orientations toward the future or collectivistic orientations toward the family are likely to be influenced by their families to move away from a state of amotivation (i.e., non-motivation) about the occupational decision. Independently of family influences, an individualistic outlook toward the future was also identified as a positive predictor of career amotivation. In turn, a state of amotivation about one's future career appeared to be closely associated with occupational or career indecision. Contrary to expectation, characteristics such as perfectionism and multipotentiality did not generally appear to play substantial roles in the career decision-making processes of the adolescents who participated in the study.

It appears that the critical variables for intellectually gifted adolescents who may be experiencing occupational/career indecision may be social influences from the family and occupational/career amotivation. Nevertheless, the strength of the relationship between occupational/career amotivation and occupational/career indecision, and the lack of any other direct predictors of occupational/career indecision, suggests that occupational/career amotivation may play the more pivotal role.

In terms of implications for practice, the model provides some direction on the areas for focus when an intellectually gifted adolescent may be experiencing some career decision-making difficulties (i.e., the degree to which the adolescent may be amotivated about the occupational decision, the existence or otherwise of family support, and cultural orientations such as whether one has an individualistic outlook with respect to the future). Some practical guidelines may also be inferred on how to direct intellectually gifted adolescents away from a state of amotivation. For example, the development of intrinsic motivation (e.g., by highlighting the interesting, enjoyable, satisfying aspects of starting a career) or extrinsic motivation (e.g., by highlighting the possible financial and social rewards of work) could be encouraged by the families of the intellectually gifted adolescents. Nevertheless, if the support of the family is not available, an alternative approach may be to promote an independent outlook with respect to the future.

Introduction

Although the occupational or career decisions of gifted adolescents may be a somewhat neglected topic of investigation, the emerging body of literature provides some suggestions on the issues that may be associated with this very important, life-changing, decision. Generally, it appears that gifted adolescents may: (i) be capable in a number of areas (Kerr & Sodano, 2003; Milgram & Hong, 1999; Emmett & Minor, 1993), (ii) experience substantial pressure from their families and/or society (Kerr & Sodano, 2003; Miller & Cummings, 2009; Emmett & Minor, 1993; Grant, Battle, & Heggoy, 2000; Greene, 2003), (iii) value well-paying occupations/careers (Kerr & Sodano, 2003; Emmett & Minor, 1993; Kelly & Cobb, 1991), (iv) value high status/prestigious occupations/careers (Miller & Cummings, 2009; Emmett & Minor, 1993), (v) have superior access to occupation/career-related information (Greene, 2003; Kelly & Cobb, 1991), (vi) have high self-expectations and aspirations (Emmett & Minor, 1993; Greene, 2003), (vii) have a need to live up to their potential (Emmett & Minor, 1993), (viii) have a need for intellectual stimulation (Emmett & Minor, 1993), and (ix) experience occupational/career indecision due to tendencies toward perfectionism (Parris, Owens, Johnson, Grebevski, & Holbert-Quince, 2010).

With respect to career decision-making difficulties, the literature suggests that some of the unique issues facing gifted adolescents may include the highly debated phenomenon of multipotentiality, or the possession of a high level of ability and interests in multiple areas (Achter, Benbow, & Lubinski, 1997; Achter, Lubinski, & Benbow, 1996; Emmett & Minor, 1993; Kerr & Sodano, 2003; Milgram & Hong, 2009; Rysiew, Shore, & Carson, 1994; Rysiew, Shore, & Leeb, 1999; Sajjadi, Rejskind, & Shore, 2001), perfectionism (Emmett & Minor, 1993; Greene, 2003, 2006; Parris, Owens, Grebevski, & Holbert-Quince, 2010; Stewart, 1999), and the high expectations of others (Delisle & Squires, 1989; Emmett & Minor, 1993; Greene, 2003, 2006; Stewart, 1999).

The research to date appears to have a focus on the specific individual factors that may influence the occupational or career decisions of gifted adolescents, without any substantial or meaningful attention to how these factors are *related* to one another, or *sequenced* in the cognitive *processes* that lead to an occupational/career decision. In this study, an attempt is made to gain a clearer and a more complete understanding of the occupational/career decisions of gifted adolescents, by developing and empirically testing a number of models of their occupational/career decision-making processes that inter-link and sequence factors that have been identified in the literature as being relevant to the decision. Such an approach to the research may enable a more sophisticated understanding of *how specifically* gifted adolescents make their occupational/career decisions.

An examination of the occupational/career decisions of gifted adolescents is important, as the occupational/career environment is the likely context in which gifted individuals may produce their most meaningful achievements, and make their most substantial contributions to society. The development and progress of society may indeed be dependent on the decisions that it's most able members make about the occupational/career fields in which they will be active for a substantial period of their lives.

The study was informed by research in multiple fields. Apart from the current knowledge on the occupational/career decisions of gifted adolescents, it also considered the existing occupational/career decision-making theories, the literature on culture, and theories of motivation. The following is a brief overview of the various literatures that formed the basis for the study.

Occupational/career decision-making theories

The phenomenon of occupational/career decision-making has been studied using a wide range of theories within the field of vocational psychology. Among the most prominent of these theories are the *trait and factor theories*, which focus on whether a "match" exists

between the individual's characteristics, such as personality, interests, abilities, or needs (Dawis, 2002; Dawis & Lofquist, 1984; Holland, 1997; Osipow, 1990) and the occupation or career. Another influential set of theories are the *developmental theories*, such as Super's theory of career stages or career choice and development (Super, 1963; Savickas, 2002), which are concerned with how an individual's progress through different life stages lead to the mastery of various vocational tasks and goals, and eventually, the selection of a particular occupation or career. Among the more contemporary theories is Gottfredson's theory of circumscription, compromise, and self-creation, which suggests that an occupational/career choice emerges after the progressive elimination of unacceptable occupations/careers on the basis of gender role, social prestige, and interests (Gottfredson, 2002; Phillips & Jome, 2005; Sauermann, 2005). By comparison, the theory of career construction (Savickas, 2002) is an example of a *postmodern theory* that recognises a number of psychological and social perspectives in occupational/career decisions through a series of propositions.

Occupational/career indecision

The various occupational/career decision-making theories appear to have some links to the phenomenon of occupational/career indecision, which is a poorly understood and "atheoretical" construct that has been widely researched in the field of vocational psychology (Tinsley, 1992). It may be defined as the lack of ability to reach a decision about one's future occupation or career (Guay, Senécal, Gauthier, & Fernet, 2003; Leong & Chervinko, 1996), or as the difficulties or problems that individuals may experience in making the occupational/ career decision (Gati, Krausz, & Osipow, 1996). Most of the research on the phenomenon has centered on its multiple predictors, including a lack of readiness (Gati et al., 1996), a lack of information (Gati et al., 1996), inconsistent information (Gati et al., 1996), a fear of success (Leong & Chervinko, 1996), a conflict of values (Germeijs & De Boeck, 2003), and uncertainty about possible outcomes (Germeijs & De Boeck, 2003). Generally, scholars

(Creed, Patton, & Prideaux, 2006; Osipow, 1999) have suggested that the phenomenon is not necessarily a *permanent* experience for adolescents. Nevertheless, the nature of the experience may be influenced by the cultural and motivational factors that have been demonstrated to impact the occupational/career decision.

Culture

Culture, which may be defined as a "collection of values, beliefs, behaviors, customs, and attitudes that distinguish a society" (Fan, 2000, p.3), may be classified using a variety of approaches (Hofstede, 2001; House et al., 1999; Inglehart & Carballo, 1997; Kluckhohn & Strodtbeck, 1961; Rokeach, 1973; Ronen & Shenkar, 1985; Schwartz,1999). One such approach, which divides culture into a number of dimensions, was proposed by Hofstede (2001) and has achieved a wide following in multiple fields (Keating, Martin, Szabo, 2002; Kirkman, Lowe, & Gibson, 2006). *Individualism* is one of the most commonly used of Hofstede's cultural dimensions, and refers to a preference for independence, the prioritization of personal goals, and an emphasis on personal attitudes in determining social behaviours, while *collectivism* is a cultural dimension that is characterized by a preference for interdependence, the prioritization of in-group goals, and an emphasis on social norms and expectations (Triandis, 1995). It is noted that individualism and collectivism are terms used to define phenomena at the societal level, and *idiocentrism* and *allocentrism* are the respective terms used at the level of the individual.

Long term orientation and *short term orientation* are two other cultural dimensions identified by Hofstede (2001) that respectively emphasize a focus on the future or the present, including future or present events and rewards. Individuals who display long term orientations are likely to make sacrifices to obtain future benefits (e.g., saving instead of spending to enable a major purchase), while those with short term orientations will tend to exhibit opposite behaviours and attitudes (Bearden, Money, & Nevins, 2006; Peterson,

Dibrell, & Pett, 2002; Yeh & Lawrence, 1995) that may reflect a focus on, and a motivation for, present day outcomes.

Motivation

As with culture, motivation may be conceptualized using a number of different theories. One of the most prominent motivational theories, *expectancy-value theory* (Bandura, 1997; Feather, 1988; Wigfield, 1994; Wigfield & Eccles, 1992, 2000), suggests that motivation to engage in a particular activity or task is simultaneously determined by the future *expectancies* that are held, and the *values* that are espoused by individuals. Future expectancies for occupational/career decision makers may include expectancies for success in particular occupations/careers, while some salient values may include the interesting or enjoyable aspects of occupations/careers, the income that is obtainable from occupations/careers, and the possible recognition from others due to one's engagement in particular occupations/careers.

Another theory of motivation that may be relevant to understanding human decisions, the *theory of reasoned action*, is one of the most widely applied theories in social psychology today (Greve, 2001; Westaby, 2005). The essence of this theory is that personal *attitudes* and *subjective norms* toward behaviours simultaneously predict one's *intentions* to engage in particular behaviors, which in turn, predict the actual behaviours themselves (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). In the context of an occupational/career decision, it is plausible that the attitudes of gifted adolescents toward various occupations, as well as subjective norms (which may be simplified to the perceived social influences or social expectations from significant others [Jung & McCormick, 2010, 2011a, 2011b; Jung, McCormick, Gregory, & Barnett, 2011]), may directly or indirectly influence their intentions to pursue particular occupations or careers.

Self-determination theory is a third theory of motivation with links to career decision-making. One of the distinguishing features of this theory is that it recognizes that motivation may exist in a number of different forms: *intrinsic motivation*, *extrinsic motivation*, and *amotivation* (Deci & Ryan, 1985; Ryan & Deci, 2000). Intrinsic motivation refers to motivation to engage in an activity for the interesting, enjoyable, and satisfying aspects of the activity experience (Deci & Ryan, 1985; Ryan & Deci, 2000), while extrinsic motivation refers to motivation that results from the rewards or goals that are separate to the activity experience, such as recognition from others or financial gain (Deci & Ryan, 1985; Ryan & Deci, 2000). Amotivation, or non-motivation, refers to a state of lacking an intention to act (Deci & Ryan, 1985; Guay, Vallerand, & Blanchard, 2000; Ryan & Deci, 2000). In the context of an occupational/career decision, amotivation (or *occupational amotivation*) may be considered to be a lack of motivation about making the occupational decision, due to an inability to perceive a connection between making the decision and its consequences (Jung & McCormick, 2010; Jung, McCormick, Gregory, & Barnett, 2011). Unlike those who are motivated intrinsically or extrinsically, occupationally amotivated individuals appear to lack autonomy and control, may feel incompetent, or may be helpless (Deci & Ryan, 1985; Pelletier, Tuson, & Haddad, 1997; Senécal, Julien, & Guay, 2003) about choosing a future occupation or career.

Theoretical Frameworks

Figures 1, 2, and 3 provide schematic representations of the three theoretical frameworks that guided the study. The theoretical frameworks were derived from theoretically and empirically developed and confirmed models of the cognitive decision-making processes of general adolescents (Jung & McCormick, 2010, 2011a, 2011b; Jung, McCormick, Gregory, & Barnett, 2011), that acknowledge cultural perspectives (i.e., idiocentrism, allocentrism, and long term orientation) and elements of motivation theories

(i.e., expectancy -value theory, the theory of reasoned action, and self-determination theory). They were tailored for gifted adolescents by the incorporation and retention of some characteristics (i.e., a need for intellectual stimulation, a desire to fulfill one's potential, the valuing of well-paying occupations/careers, the valuing of high status/prestige occupations/careers, multipotentiality, and perfectionism) that have been repeatedly noted in the literature.

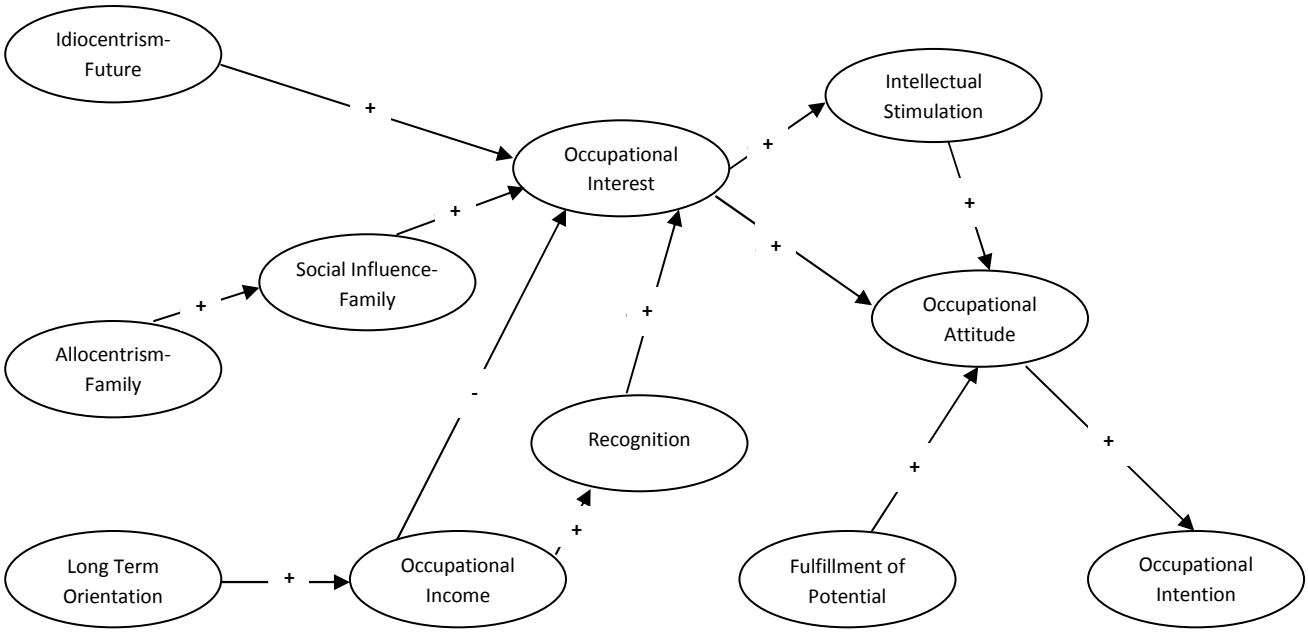

Figure 1. Theoretical Framework 1.

Theoretical Framework 1 proposes that gifted adolescents with idiocentric orientations toward their future or allocentric orientations toward their family will value the interesting or enjoyable aspects of occupations, with social influences from the family playing a mediating role for those who are allocentric toward their family. In contrast, gifted adolescents who place importance on future events and rewards are proposed to value the income that is

obtainable through occupations (which may be incompatible with the valuing of interest or enjoyment in occupations, but compatible with the valuing of other extrinsic rewards, such as recognition from others). The valuing of recognition from others is proposed to coincide with the valuing of occupational interest/enjoyment. In turn, the valuing of occupational interest/enjoyment is proposed to predict the attitudes that gifted adolescents form of various occupations, and eventually, the intentions to pursue certain occupations. Additionally, and in acknowledgement of the characteristics unique to gifted adolescents, the valuing of occupational interest/enjoyment is proposed to be associated with a need for intellectual stimulation, which together with a desire to fulfill one's potential may be related to the attitudes of gifted adolescents toward occupations.

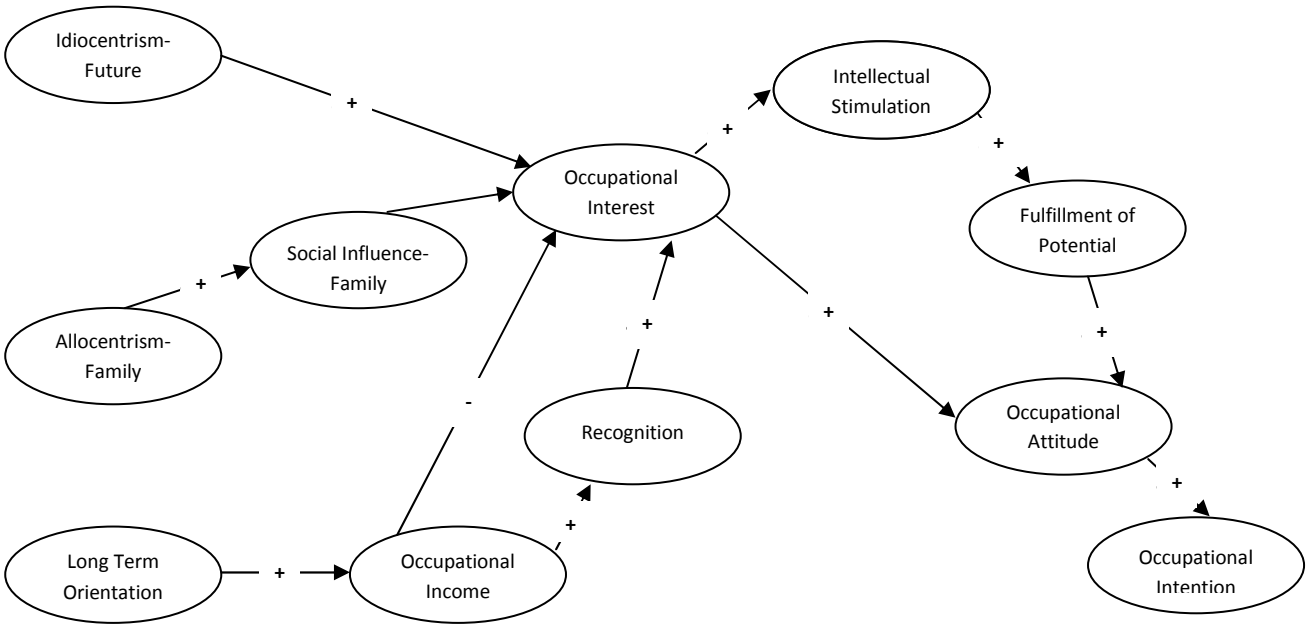

Figure 2. Theoretical Framework 2.

Theoretical Framework 2 is identical to Theoretical Framework 1, with the exception of the relationships surrounding attitudes toward occupations. In Theoretical Framework 2, the

valuing of interest or enjoyment in an occupation is proposed to be associated with a gifted adolescent's need for intellectual stimulation, which in turn, may predict a desire to fulfill his/her potential. A desire to fulfill one's potential is thereafter proposed to inform a gifted adolescent's attitudes toward occupations. As in Theoretical Framework 1, a direct relationship is simultaneously proposed to exist between the valuing of interest or enjoyment in occupations and occupational attitudes.

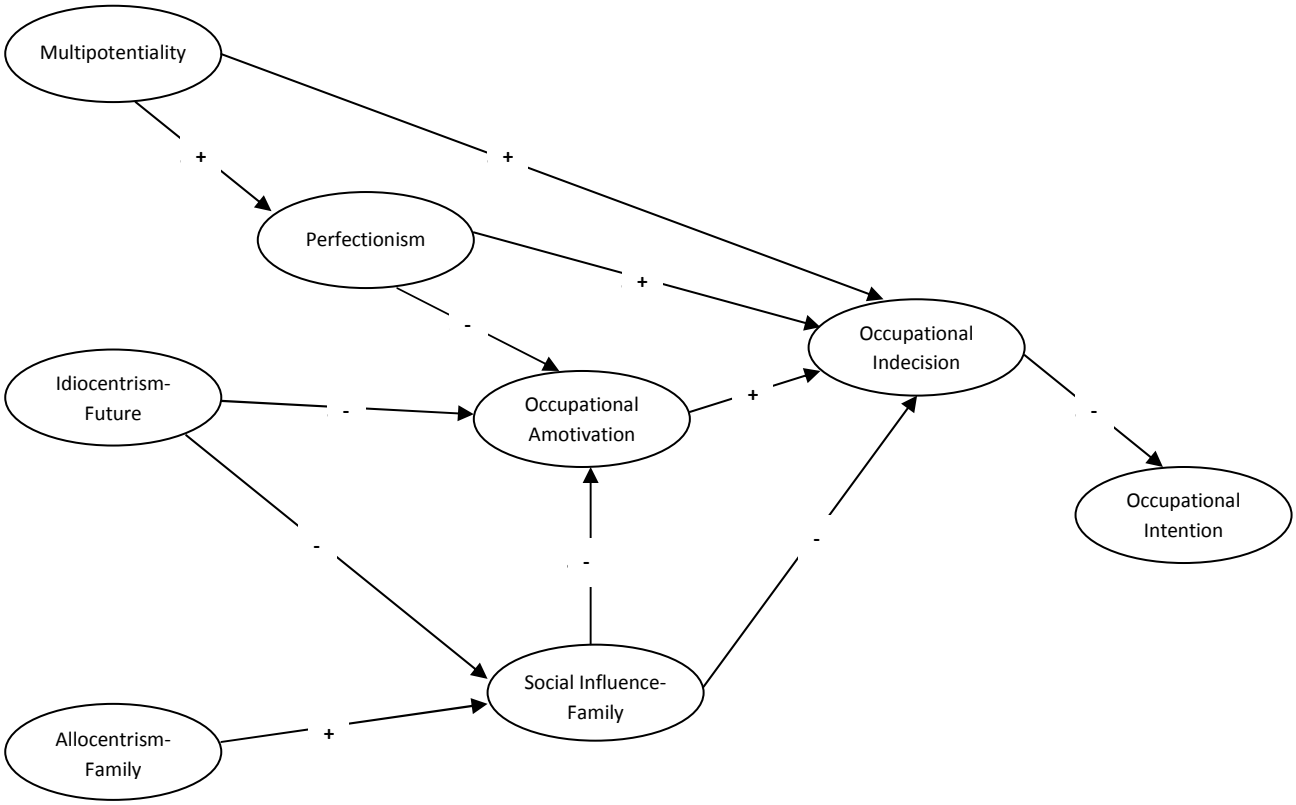

Figure 3. Theoretical Framework.

Theoretical Framework 3 proposes that multiple factors may lead to amotivation and indecision about a gifted adolescent's future occupation or career. First of all, multipotentiality may positively predict tendencies toward perfectionism, which in turn, may

direct gifted adolescents away from a state of amotivation about a future occupation or career. Similarly, it is proposed that idiocentric orientations toward the future and social influences from the family (which may be positively predicted by allocentric orientations toward the family and negatively predicted by idiocentrism with respect to the future) are unlikely to lead to occupational amotivation. Occupational amotivation itself, along with tendencies toward perfectionism and multipotentiality, may positively predict occupational indecision, while social influences from the family may direct gifted adolescents away from it. Finally, it is proposed that gifted adolescents who are undecided about their future occupation may be unable to form any intentions to pursue a particular occupation or career.

Method

Participants

A total of 1,351 students who were enrolled in six academically selective high schools in the greater Sydney metropolitan area (Australia) participated in the research. All of these volunteering students completed paper versions of a research instrument (i.e., a survey) during school hours at venues that were located within school grounds.

Six hundred and eighty-seven students from three high schools participated in the first phase of the research. These students were enrolled in Grades 9 (n = 302), 10 (n = 245), and 11 (n = 140), and were aged between 13 and 17 (M = 15.22, SD = 0.91). There were more male (52%) than female participants, and most (87%) were born in Australia. Forty-eight percent of the participants were of Anglo-Saxon/Celtic ancestry, 28% were of East Asian ancestry, 4% were of other Western European ancestry, 4% were of Southeast Asian ancestry, 3% were of South Asian ancestry, and 10% were of mixed ancestry. The average socio-economic status of the participants, as assessed by converting information on parental/guardian occupations into a score on the ANU4 scale ("a socioeconomic index based

on a scaling of occupations"; Jones & McMillan, 2001, p.547), was slightly above the level of a general manager, but below the level of most professionals.

Six hundred and sixty-four students, attending another three high schools participated in the second phase of the research. The participants were from all three grades (i.e., 172 in Grade 9, 232 in Grade 10, and 260 in Grade 11), and were aged between 13 and 18 (M = 15.67, SD = 0.92). More male (60%) than female students participated. The mean socio-economic status of the participating students was approximately at the level of a "computing professional", which is below the level of many other professionals in fields such as medicine and law, but above the level of "social welfare professionals" and associate professionals in fields such as real estate. The participants had East Asian (47%), Anglo-Saxon/Celtic (32%), South Asian (8%), non-Anglo-Saxon/Celtic Western European (3%), Eastern European (2%), Southeast Asian (2%), and mixed (6%) ancestries.

Instrument

The survey instrument used in the study incorporated open-ended items on the socio-demographic characteristics of the participants (i.e., age, grade, gender, parental/ guardian occupation, place of birth, ancestry, and school attended), and 88 closed-ended items that were designed to assess the 15 constructs forming the three theoretical frameworks that guided the study. A seven point Likert-type scale was utilized for all of the closed-ended items, with response categories ranging from *strongly disagree* (1) to *strongly agree* (7).

The items designed to assess eleven of the constructs (i.e., Allocentrism-Family, Long Term Orientation, Idiocentrism-Future, Occupational Intention, Recognition, Occupational Attitude, Social Influence-Family, Occupational Income, Occupational Interest/Enjoyment, Occupational Amotivation, and Occupational Intention) were developed, tested, and refined over two phases of data collection with a total of 1,058 high school students (Jung & McCormick, 2010, 2011a, 2011b; Jung, McCormick, Gregory, & Barnett, 2011). The

Cronbach alpha values of these scales ranged from .64 to .91. These items were supplemented by a number of additional items, including “Ultimately, I determine where I end up in life” (Idiocentrism-Family).

To assess Fulfillment of Potential, a pool of items was developed after the examination of related scales used by Bundick (2011; “Fulfillment of potential”), Schuster (1990; “Fulfillment of potential”), Harackiewicz, Durik, Barron, Linnenbrink-Garcia, and Tauer (2008; the “Workmastery” scale), and Benson and Scales (2009; “Thriving orientation”). These items were narrowed to a selection of six for incorporation into the final instrument. One of these items was “I would like to live up to my intellectual abilities”, which was an adaptation of “On the whole, how well do you think you have lived up to your intellectual abilities?” in Schuster (1990).

Similarly, to assess Intellectual Stimulation, a pool of items was developed from items in instruments developed or used by Krause and Coates (2008; “Intellectual Engagement Scale”), Bolkan and Goodboy (2010; “Challenging Students Scale”), and Zytowski (2006; Super’s Work Values Inventory – Revised). An example of one of the six items included in the final instrument was “This job/occupation will test the limits of my abilities”, which was adapted from “How important is a job where I can test the limits of my abilities?” (Zytowski, 2006).

The literature in the fields of gifted education and vocational psychology were investigated to identify items to assess Multipotentiality, which does not appear to have been previously assessed using a published multiple item scale. Rothney (1972, p.79; “I have found that if I apply myself, I can do about anything”), Delisle (1984, p.107; “I have many things that I would like to do, and would be good at” adapted from “....I have too many things I like to do and I am good at”), and Emmett and Minor (1993, p.361; “No matter what I’m doing, everything else looks interesting”) were the source of three of these items, while a

fourth item comprised the first sentence of a single-item scale used in Rysiew (1994), that was validated by seven subject matter experts ("I have the ability and desire to pursue different activities and goals", p.41). To ensure that an adequate number of items were available to assess the construct, two further items were included in the instrument.

Finally, the items that were designed to assess Perfectionism originated from the "Concern Over Mistakes and Doubts" subscale (Cronbach alpha = .83) of the Frost Multidimensional Perfectionism Scale (Hawkins, Watt, & Sinclair, 2006). An example of an included item was "Even when I do something very carefully, I often feel that it is not quite right". The subscale was chosen because of the emphasis given to concern over mistakes and doubts about actions in the conceptualization of perfectionism by Frost, Marten, Lahart, and Rosenblate (1990). The Organization and Parental Expectations and Criticism subscales were not selected due to questions about their utility (Fletcher & Speirs Neumeister, 2012; Frost et al., 1990; Frost, Heimberg, Holt, Matta, & Neubauer, 1993), and as the Social Influence-Family scale was already being used to assess parental influence.

Phase 1 Results

IBM SPSS Statistics (version 20.0) was used to input, screen, and clean the survey data collected from the participants of the study. The data were thereafter exported into LISREL (version 8.80) for the conduct of confirmatory factor analyses and structural equation modeling procedures. The Diagonally Weighted Least Squares (DWLS) method of estimation was used for *all* data analyses, due to its compatibility with the ordinal-type data that was collected (Hair, Black, Babin, & Anderson, 2010). The EM (Expectation-Maximization) algorithm was used to treat any missing data.

Confirmatory factor analyses

Initially, two full measurement models were estimated. The first full measurement model comprised items that were designed to load onto the 11 constructs of the Theoretical

Framework 1 and 2, while the second full measurement model comprised items that were designed to load onto the eight constructs of Theoretical Framework 3. The goodness of fit of the full measurement models were assessed using the following criteria (Byrne, 1998; Weston & Gore, 2006):

(a) whether the t statistic of the measurement equation was at least 1.96;

(b) whether the R^2 value of each measurement equation was between .30 and 1.00; and

(c) whether most a priori specified goodness of fit statistics (i.e., χ^2/df, RMSEA, NFI, NNFI, CFI, SRMR, GFI, and AGFI) were "good".

Items, starting with those that were most problematic, were progressively removed from these models, until all of the above conditions were satisfied. A total of 11 items, including all of the items designed to load onto Long Term Orientation, needed to be removed before the first full measurement model could be accepted. This model had a good fit (χ^2 = 2,619.16, p = 0, df = 1,179; χ^2/df = 2.22; RMSEA = .04; NFI = .97; NNFI = .98; CFI = .98; SRMR = .06; GFI = .97; AGFI = .97) to the data. Seven items, in comparison, needed to be discarded from the second full measurement model before a well-fitting (χ^2 = 1,450.68, p = 0, df = 712; χ^2/df = 2.04; RMSEA = .04; NFI = .96; NNFI = .98; CFI = .98; SRMR = .05; GFI = .98; AGFI = .98) model with no problematic issues could be accepted.

Construct validity and reliability

Prior to the conduct of structural equation modeling to test the three theoretical frameworks that guided the study, an analysis was undertaken of the psychometric properties of the 15 constructs that comprised the full measurement models.

Construct validity. All factors appeared to have convergent validity, as all the items in the finally accepted full measurement models had factor loadings in excess of .50 (Hair et al., 2010). Thereafter, to establish whether discriminant validity was an issue, the size of the correlations between the factors were examined. For each of the three factor pairings with

correlations in excess of .70 (i.e., Occupational Attitude and Occupational Interest/ Enjoyment, Occupational Attitude and Occupational Intention, and Occupational Interest/Enjoyment and Occupational Intention), further investigations were conducted by comparing the goodness of fit of a single "combined" factor that comprised all the items loading onto the two factors, with the their equivalent two-factor models. In all three cases, the two-factor models were found to be superior on a range of goodness of fit indices (and for two of the factor pairings, the chi-square difference [$\Delta\chi^2$] statistic was also significant). Therefore, discriminant validity was established for the potentially problematic factors.

Reliability. All the factors in the full measurement models had acceptable levels of reliability, as demonstrated by Cronbach alpha values (Idiocentrism-Future = .76; Allocentrism-Family = .86; Occupational Interest/Enjoyment = .80; Fulfillment of Potential = .82; Social Influence-Family = .92; Occupational Income = .85; Intellectual Stimulation = .85; Recognition = .76; Occupational Attitude = .82; Occupational Intention = .86; Perfectionism = .64; Occupational Amotivation = .84; Multipotentiality = .78; Occupational Indecision = .87).

Structural Equation Modeling

As all of the items loading onto Long Term Orientation needed to be removed during the development of the full measurement model, this factor, along with the path from Long Term Orientation to Occupational Income, was removed from Theoretical Framework 1 and 2.

Theoretical Framework 1. The initially estimated structural equation model of Theoretical Framework 1 had a less than adequate fit to the full data set, when the abovementioned criteria to assess the fit of the full measurement models were applied. To address the issue, some modifications to the model were progressively made. Specifically, the path from Intellectual Stimulation to Occupational Attitude was trimmed, while three of the

items loading onto Idiocentrism-Future ("Ultimately, I determine where I end up in life", "My future is mostly determined by my own preferences", and "When making decisions about my future, I have to give priority to my own goals") were removed. The new, smaller Idiocentrism-Future scale had acceptable levels of reliability (α = .74) and convergent validity (i.e., factor loadings in excess of .50), and no issues with discriminate validity. The resulting structural equation model (refer Figure 4) had a good fit (χ^2 = 2,884.27, p = 0, df = 1,064; χ^2/df = 2.71; RMSEA = .05; NFI = .96; NNFI = .97; CFI = .98; SRMR = .08; GFI = .95; AGFI = .95; AIC = 3,108.27; CAIC = 3,727.89; ECVI = 4.53) to the data. It is noted that the size of the standardized path coefficient between Occupational Interest/Enjoyment and Occupational Attitude was not problematic, as path coefficients between constructs in LISREL models are regression coefficients which may have values greater than one (Jöreskog, 1999).

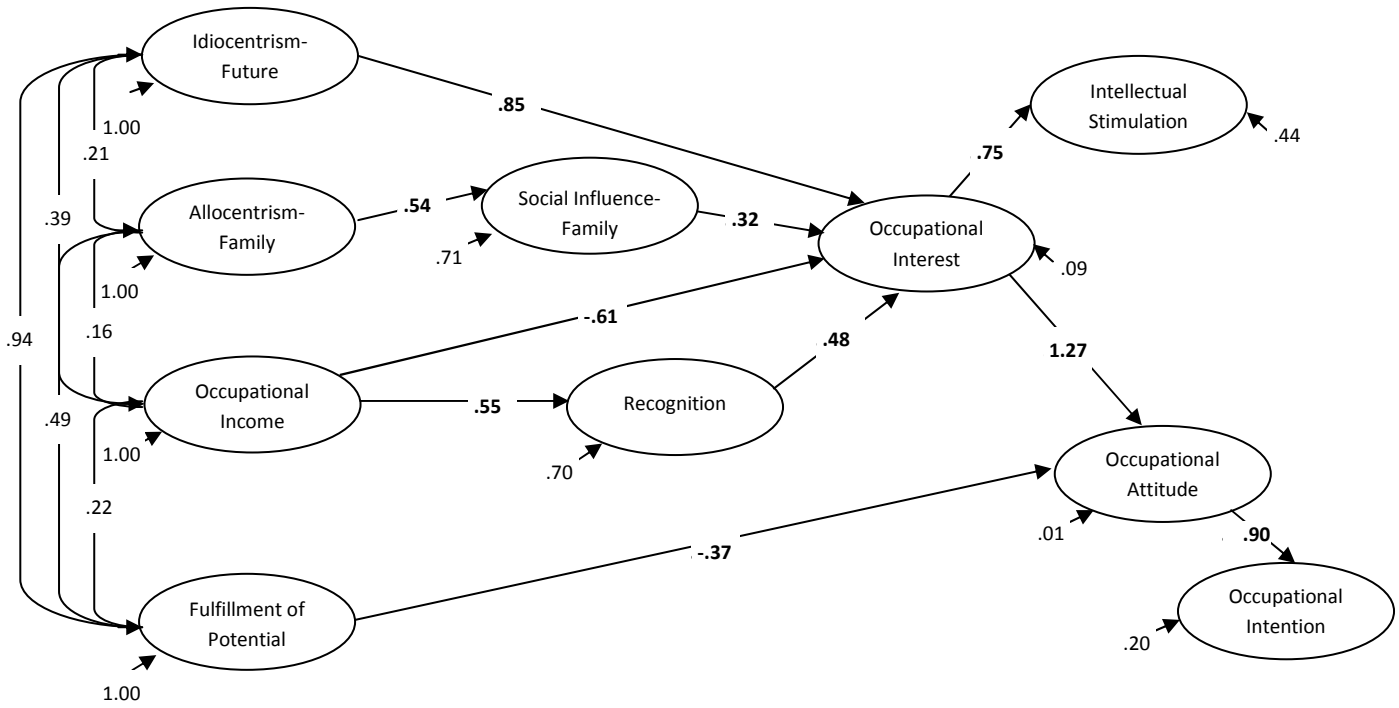

Figure 4. Refined Theoretical Framework 1 ("Theoretical Framework 1R").

Theoretical Framework 2. The initially estimated structural equation model (refer Figure 5) had a good fit (χ^2 = 3,252.63, p = 0, df = 1,210; χ^2/df = 2.69; RMSEA = .05; NFI = .96; NNFI = .97; CFI = .97; SRMR = .08; GFI = .95; AGFI = .95; AIC = 3,484.63; CAIC = 4,126.38; ECVI = 5.08) to the full data set. Consequently, no modifications to this model were necessary, including modifications to any of the factors that comprised the model.

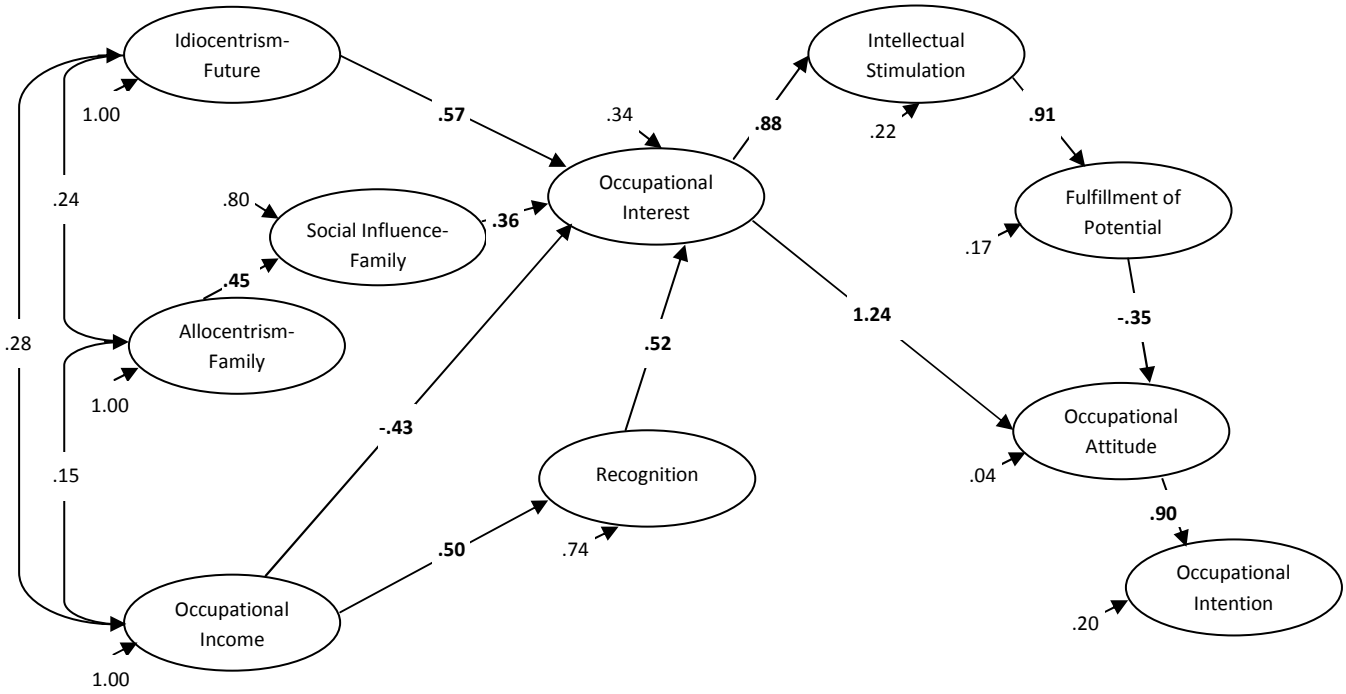

Figure 5. Theoretical Framework 2.

Theoretical Framework 3. The initially estimated structural equation model of Theoretical Framework 3 contained three non-significant paths (i.e., from Multipotentiality to Occupational Indecision, from Perfectionism to Occupational Indecision, and from Social Influence-Family to Occupational Indecision). These paths were sequentially trimmed, before a model with no problematic issues and a good fit to the data (χ^2 = 1,655.03, p = .00, df =

729; $\chi^2/df = 2.27$; RMSEA = .04; NFI = .96; NNFI = .98; CFI = .98; SRMR = .07; GFI = .97; AGFI = .96) could be accepted. This model is schematically represented in Figure 6.

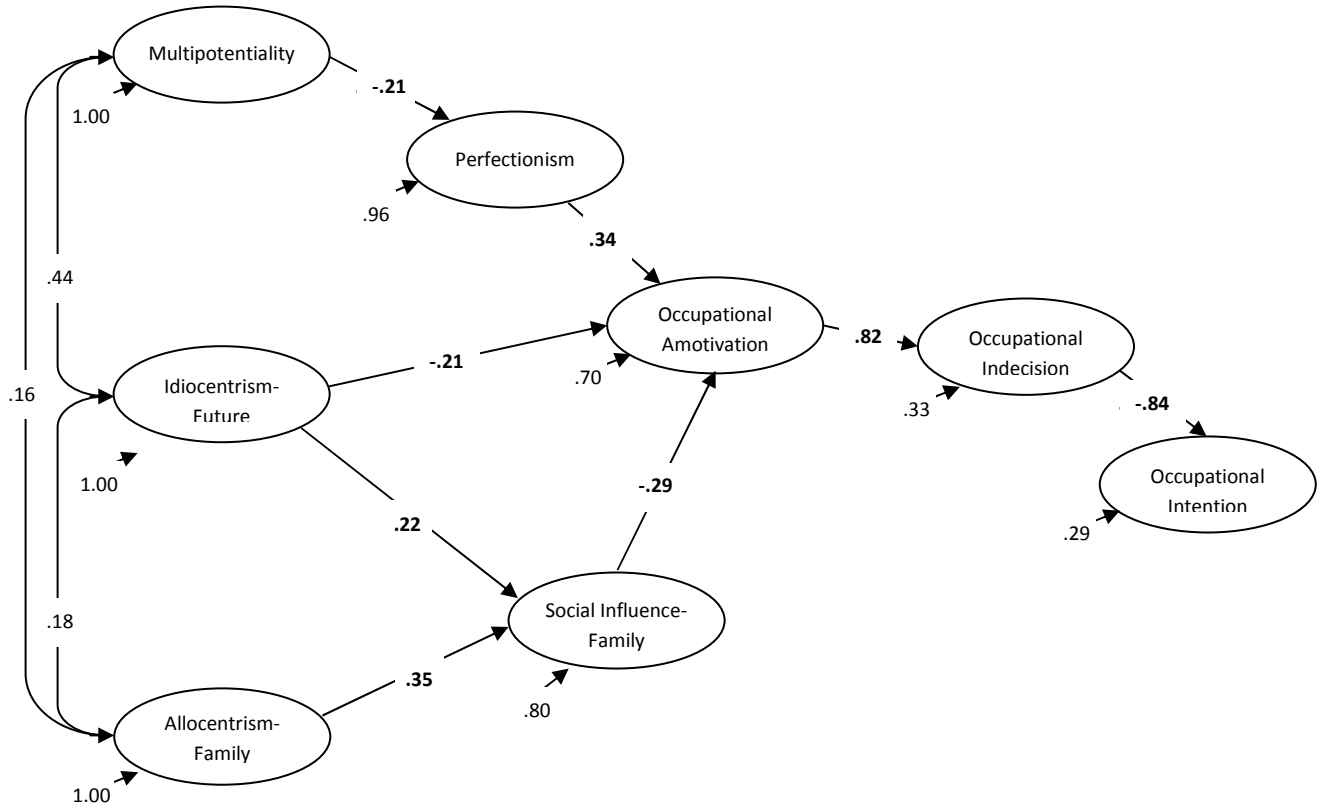

Figure 6. Refined Theoretical Framework 3 ("Theoretical Framework 3R").

Qualitative Data Analysis

A thematic analysis of the descriptive data provided by the research participants suggested the existence of the following themes in their occupational/career decision-making processes:

- Interest (i.e., interest from a young age, interest in the occupational area, interest in subject matter, stimulation)

- School subjects (i.e., enjoyment of subject area, ability/performance in subject area)
- Influence of others (i.e., family, teacher/school/career counsellor, peers)
- Desire to work with people
- Challenge
- Enjoyment
- Work experience
- Undecided (i.e., have multiple jobs under consideration, unclear/unsure of future)
- Delayed decision
- Income
- Abilities and interests in multiple areas

The qualitative data provided support for many of the individual factors that comprised the three theoretical frameworks that guided phase one of the study.

Other

It is noted that no substantial gender differences were found in the occupational/career decision-making processes of intellectually gifted adolescents. Furthermore, a separate analysis of any differences by ancestry did not appear to be meaningful due to the wide disparity in the numbers of participants from the different ancestral groups.

Phase 2 Results

The three theoretical frameworks that guided the study, along with the empirically verified and refined versions of these theoretical frameworks, were thereafter *re-assessed* by repeating the above procedures with an independent sample of data (i.e., the data collected in the second phase of the study). Such an additional analysis of inter-related models formed part of a *competing models strategy* to avoid a possible confirmation bias that may exist when testing models in isolation, and to gain better insights into the comparative explanatory power of models (Hair et al., 2010; Kline, 2005). Simultaneously, it formed part of a strategy that

was designed to *confirm* the models assessed and verified in the first phase of the study (Hair et al., 2010; Kline, 2005).

Confirmatory factor analyses

Again, two full measurement models were estimated. The first full measurement model comprised items that were designed to assess the constructs forming part of Theoretical Framework 1, the empirically refined version of the Theoretical Framework 1 ("Theoretical Framework 1R"), and Theoretical Framework 2. A total of eight items needed to be progressively removed from this model before a well-fitting model (i.e., χ^2 = 2,605.93, p = 0, df = 1,130; χ^2/df = 2.31; RMSEA = .04; NFI = .97; NNFI = .98; CFI = .98; SRMR = .06; GFI = .97; AGFI = .97) with no problematic issues could be accepted. The second full measurement model comprised items that were designed to assess the constructs forming part of Theoretical Framework 3 and the empirically refined version of this theoretical framework ("Theoretical Framework 3R"). Again, a total of eight items needed to be progressively removed from this model before it was possible to develop a full measurement model with no problematic issues and a good fit to the data (χ^2 = 1,058.15, p = .00, df = 712; χ^2/df = 1.49; RMSEA = .04; NFI = .95; NNFI = .98; CFI = .98; SRMR = .06; GFI = .98; AGFI = .98).

Construct validity and reliability

Construct validity. The 14 factors of interest appeared to have satisfied the requirements for convergent validity as *all* of the standardized factor loadings in the two full measurement models were in excess of .50. In addition, to assess whether discriminant validity may be an issue, the size of the correlations among the factors were examined. Specifically, any potentially problematic factor pairings with correlations in excess of .70 (i.e., Occupational Attitude/Occupational Intention, Occupational Attitude/Occupational Interest Enjoyment, Intellectual Stimulation/Fulfillment of Potential, Occupational Intention/ Occupational Amotivation, and Occupational Intention/Occupational Indecision) were

subject to further investigation. For each of these factor pairings, a *combined* single-factor measurement model of the items that loaded onto both factors was developed, and compared to their equivalent two-factor measurement models. In *all* cases, the two-factor models had superior fit according to a range of pre-determined fit indices (i.e., χ^2/df, RMSEA, NFI, NNFI, CFI, SRMR, GFI, and AGFI), *and* a significant chi-square difference ($\Delta\chi^2$) statistic. Discriminant validity was therefore established for all of the potentially problematic factor pairings.

Reliability. The 14 factors had an acceptable level of reliability, as reflected in their Cronbach alpha values (Idiocentrism-Future = .78; Allocentrism-Family = .87; Occupational Interest/Enjoyment = .84; Fulfilment of Potential = .84; Social Influence-Family = .93; Occupational Income = .87; Intellectual Stimulation = .86; Recognition = .78; Occupational Attitude = .82; Occupational Intention = .86; Perfectionism = .71; Occupational Amotivation = .86; Multipotentiality = .79; Occupational Indecision = .88).

Structural Equation Modeling

Following confirmation that the 14 factors that comprised the five theoretical frameworks had adequate psychometric properties, structural equation models were estimated of these theoretical frameworks.

Theoretical Framework 1. The initially estimated structural equation model of Theoretical Framework 1 had a number of problematic issues. These issues were addressed by the progressive removal of four items (i.e., two items designed to assess Occupational Interest/Enjoyment, and another two items designed to assess Idiocentrism-Future). The reliabilities of the modified factors remained acceptable after the items were removed (i.e., α = .80 for Occupational Interest/Enjoyment, and α = .70 for Idiocentrism-Future), while significant chi-square difference ($\Delta\chi^2$) statistics (along with a range of goodness of fit indices)

suggested that the two factors remained distinct from Occupational Attitude and Occupational Intention.

Additionally, three paths (i.e., from Intellectual Stimulation to Occupational Attitude, from Occupational Income to Occupational Interest/Enjoyment, and from Recognition to Occupational Interest/Enjoyment) were progressively trimmed to address the non-significance of these paths or negative error variance issues. The resulting model (refer Figure 7) satisfied all of the abovementioned criteria for the assessment of measurement models, and had a good fit (i.e., χ^2 = 2,016.86, p = 0, df = 619; χ^2/df = 3.26; RMSEA = .06; NFI = .97; NNFI = .98; CFI = .98; SRMR = .07; GFI = .98; AGFI = .97; AIC = 2,184.86; CAIC = 2,646.71; ECVI = 3.30) to the data.

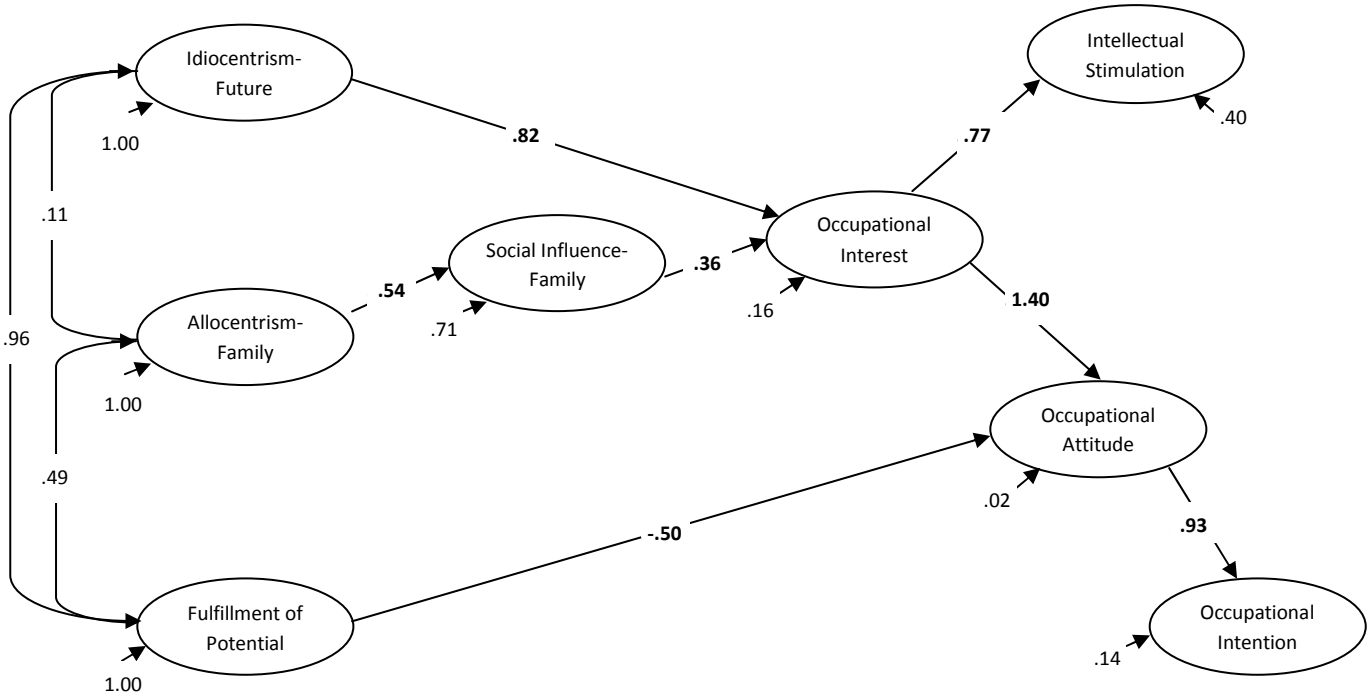

Figure 7. Final structural model of Theoretical Framework 1 and Theoretical Framework 1R.

Theoretical Framework 1R. Most of the issues that were identified in the initially estimated model of Theoretical Framework 1 were again found in the initial structural equation model that was estimated of Theoretical Framework 1R. These were resolved by the progressive removal of four items (i.e., two items each that were designed to assess Occupational Interest/Enjoyment and Idiocentrism-Future), and the progressive trimming of two non-significant paths (i.e., from Occupational Income to Occupational Interest/ Enjoyment, and from Recognition to Occupational Interest/Enjoyment). The resulting model (refer Figure 7) was *identical* to the finally accepted version of the structural equation model that was developed from Theoretical Framework 1.

Theoretical Framework 2. As for the other two theoretical frameworks, a number of issues were identified in the initially estimated model of Theoretical Framework 2. These were addressed by the removal of one item that was designed to assess Occupational Interest/

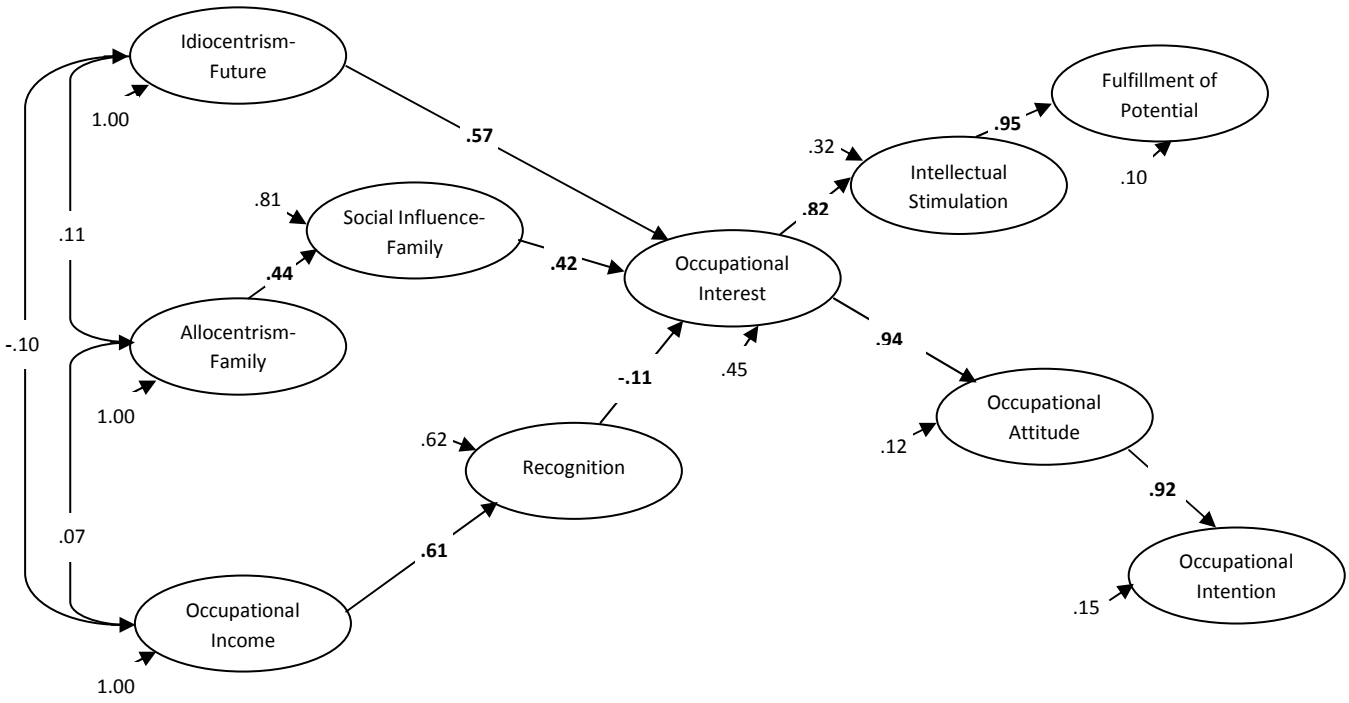

Figure 8. Final structural model of Theoretical Framework 2.

Enjoyment (the revised Cronbach alpha value for Occupational Interest/Enjoyment was acceptable at .82, and discriminant validity with Occupational Attitude was again established, according to a statistically significant chi square difference [$\Delta\chi^2$] statistic, and a range of other goodness of fit indices). In addition, two non-significant paths (i.e., from Fulfillment of Potential to Occupational Attitude, and from Occupational Income to Occupational Interest/Enjoyment) were progressively trimmed. The resulting model (refer Figure 8) satisfied all of the abovementioned criteria and had a good fit (i.e., χ^2 = 3,133.76, p = 0, df = 1,115; χ^2/df = 2.81; RMSEA = .05; NFI = .96; NNFI = .97; CFI = .98; SRMR = .08; GFI = .96; AGFI = .95; AIC = 3,353.76; CAIC = 3,958.57; ECVI = 5.06) to the data.

Theoretical Framework 3. The initially estimated structural equation model of Theoretical Framework 3 largely satisfied the abovementioned criteria used to assess measurement models. Nevertheless, a number of the path relationships in the model were not statistically significant. Consequently, the following path relationships, in order of the degree of statistical non-significance, were progressively trimmed: (a) from Social Influence-Family to Occupational Indecision, (b) from Mulitpotentiality to Occupational Indecision, (c) from Multipotentiality to Perfectionism, (d) from Perfectionism to Occupational Indecision, and (e) from Perfectionism to Occupational Amotivation. In addition, both Mulitpotentiality and Perfectionism needed to be removed as the two factors no longer contributed any paths to the model. The resulting model had no problematic issues and a good fit (χ^2 = 929.83, p = .00, df = 488; χ^2/ df = 1.91; RMSEA = .05; NFI = .95; NNFI = .97; CFI = .98; SRMR = .07; GFI = .97; AGFI = .96) to the data. A schematic representation of the model, as assessed using the second data sample, is shown in Figure 9.

Theoretical Framework 3R. The initially estimated structural equation model of Theoretical Framework 3R was relatively free of problems. The only necessary modifications to the model were the trimming of the path from Perfectionism to Occupational Amotivation

(which was marginally non-significant) and the removal of both Perfectionism and Multipotentiality from the model (neither of which contributed any paths to the model after trimming the path from Perfectionism to Occupational Amotivation). The resulting model had no problematic issues and a good fit to the data. It was also *identical* to the refined version of Theoretical Framework 3.

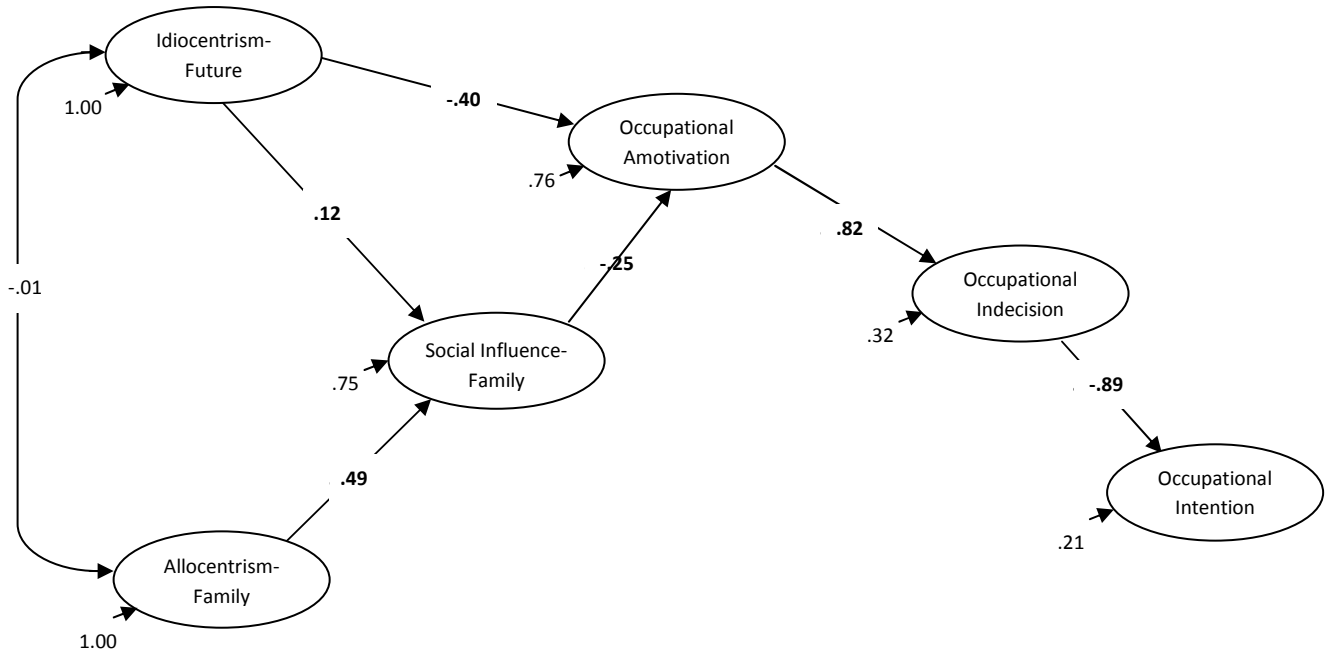

Figure 9. Final structural model of Theoretical Framework 3 and Theoretical Framework 3R.

Comparison of the refined versions of the Theoretical Frameworks

The refined versions of the five theoretical frameworks may be divided into two groups. The refined versions of Theoretical Frameworks 1, 1R, and 2 represented variations on the cognitive decision-making processes of intellectually gifted adolescents leading to intentions to pursue particular occupations or careers. In comparison, the refined versions of Theoretical Frameworks 3 and 3R represented variations on the cognitive decision-making

processes of intellectually gifted adolescents associated with occupational or career indecision.

The refined versions of Theoretical Frameworks 1, 1R, and 2 had very similar levels of fit to the data, despite differences in their level of model complexity. The major difference between the models was that the relationship between Recognition to Occupational Interest/Enjoyment was *marginally* statistically insignificant in the refined versions of Theoretical Frameworks 1 and 1R, but *marginally* statistically significant in the refined version of Theoretical Framework 2. Of these models, the (identical) structural equation model derived from Theoretical Framework 1 and Theoretical Framework 1R was determined overall to be the optimal model, due to its superior fit according to three of the indices (i.e., NNFI, CFI, and SRMR) that are comparatively robust to sample size, and indices (i.e., AIC, CAIC, and ECVI) that have been specifically identified as being salient when making a selection among competing non-hierarchical models (Brown, 2006; Diamantopoulos & Siguaw, 2000; Kline, 2005).

No comparison was necessary between the refined and empirically verified versions of Theoretical Framework 3 and Theoretical Framework 3R, as testing of the two theoretical frameworks with the second phase data resulted in the development of an identical model.

Qualitative Data Analysis

An analysis of the descriptive data provided by the research participants essentially replicated the themes identified with the descriptive data in the first phase of the study:

- Interest (i.e., interest in an activity related to the occupation, interest in occupational area, interest from a young age, stimulation)
- Influence and expectations of others (i.e., family, friends, school, teacher)
- School subjects (i.e., enjoyment of subject area, ability/performance in subject area)
- Expectations of the occupation (i.e., enjoyable, challenging, fun)

- Qualifications/suitability (i.e., meeting of entry criteria, possession of skills)
- Income
- Challenge
- Experience
- Undecided
- Research undertaken about occupations
- Abilities and interests in multiple areas

Again, the qualitative data analysis provided support for many of the factors that comprised the five theoretical frameworks that guided the second phase of the study

Other

In accordance with the results of the first phase of the study, no substantial gender differences were identified in the way in which intellectually gifted adolescents make their occupational/career decisions. Moreover, a separate analysis of any ancestral differences in the decision-making processes of intellectually gifted adolescents did not appear to be very meaningful due to the wide disparity in the numbers of participants from the different ancestral groups.

Discussion

The two finally accepted models provided some useful insights into the cognitive decision-making processes of intellectually gifted adolescents with respect to their intentions to pursue a particular future occupation/career and occupational/career indecision. The models indicated that the career decision-making processes of gifted adolescents may be simultaneously similar and different to those of the general adolescent population. The findings are noteworthy, as they represent the first known attempt at modelling the cognitive career decision-making processes of gifted adolescent. The findings of the study may begin to

fill important gaps in our current understanding of the occupational/career decisions of gifted adolescents.

Cognitive processes that lead to intentions to pursue a particular career

Firstly, the finally accepted model of the cognitive decision-making processes that lead to intentions to pursue particular occupations/careers suggested that, generally, gifted adolescents who are collectivistic with respect to their family are likely to be substantially influenced by their family members, who may direct them to value interest and enjoyment in occupations. Similarly, adolescents of high ability with an individualistic outlook toward the future appear to place substantial importance on interesting and/or enjoyable occupations when contemplating their futures. In turn, the valuing of interest or enjoyment in occupations was found to be a strong and positive predictor of both a need for intellectual stimulation, and the attitudes that high ability adolescents form of occupations. In contrast, and as expected, a need to fulfil one's potential was identified as being negatively associated with attitudes toward occupations. Lastly, occupational attitudes were shown to be strongly predictive of the intentions that are eventually formed by high ability adolescents to pursue certain occupations.

Although all of the path relationships in the model were statistically significant, some (i.e., from occupational interest/enjoyment to occupational attitude, from occupational attitude to occupational intention, and from idiocentrism-future to occupational interest/enjoyment) were stronger than the others. By linking paths with the strongest relationships in the model, it was possible to identify a fundamental "backbone" cognitive process pathway for the career decisions of intellectually gifted adolescents (i.e., idiocentrism-future – occupational interest/enjoyment – occupational attitude – occupational intention). The pathway suggests that highly able adolescents who are individualistic with respect to the future are likely to value interesting and enjoyable occupations, which is what

informs positive attitudes toward occupations, and in turn, actual intentions to pursue any occupations. Due to the pattern of path relationships in the model, two constructs that form a part of this fundamental pathway (i.e., occupational interest/enjoyment and occupational attitude) may also be considered as the major mediating constructs that are likely to play *pivotal* and *critical* roles in the career decision-making processes of intellectually gifted adolescents. In particular, the prominence given to occupational interest/enjoyment suggests that it may take precedence over all other occupational values for highly able adolescents who are contemplating their futures.

Two relationships in the model were specific to intellectually gifted adolescents. First of all, the positive predictive path relationship between occupational interest/enjoyment and a need for intellectual stimulation suggests that the occupational activities that intellectually gifted adolescents find interesting and enjoyable may be those that provide an appropriate level of intellectual stimulation and challenge. The unique characteristics and abilities of intellectually gifted students may mean that what absorbs, intrigues, and provokes excitement for this group, may be different to that for the rest of the adolescent population. It is indeed possible that some routine and semi-skilled occupational activities, such as those in the hospitality industry, which may be considered enjoyable and desirable by many adolescents, are considered tedious and dull (on average) by highly able adolescents.

The negative relationship between a desire to fulfil one's potential and occupational attitude was noteworthy. The notion that highly able adolescents may have unfavourable attitudes toward those occupations that may fulfil their potential may be explained, firstly, by a possible resentment toward the substantial and possibly excessive expectations and pressures that they may experience from other members of society. It is quite plausible that many highly able adolescents will object to the making of an occupational decision primarily out of a sense of *responsibility* to make the most of one's abilities. Alternatively, due to a

possible non-coincidence of occupations that are compatible with their area(s) of ability and interest (Lubinski & Benbow, 2006), high ability adolescents may instead face a dilemma that is eventually resolved by giving precedence to occupations that are considered interesting and enjoyable. It may indeed be the case that a need to fulfil one's potential is seen as comparatively less important to interest or enjoyment, and therefore possibly distracting for highly able adolescents who are already faced with a difficult, life-changing decision.

The absence of the constructs occupational income or recognition from others, both of which are extrinsically motivated values, from the model suggests that unlike for adolescents generally, intellectually gifted adolescents may not be very concerned about pursuing occupations for the attainment of a reward that is separate to the inherent experience of the occupation. The positive relationship between social influence-family and occupational interest/enjoyment suggests that family members may, generally, be quite supportive of this mindset. Nevertheless, an acknowledgement needs to be made that the types of occupations that highly able adolescents find interesting or enjoyable (i.e., those that provide intellectual stimulation) may *coincide* with the types of occupations that produce financial rewards and recognition from others. It is certainly possible that the occupations that are intellectually stimulating are the ones that are likely to be held in high regard, are consistent with societal expectations, are financially rewarding, and are prestigious, even though the associated occupational values are not explicitly espoused. It *may* be that the preferences of intellectually gifted adolescents toward well-paying occupations (Kerr & Sodano, 2003; Emmett & Minor, 1993; Kelly & Cobb, 1991) and high status/prestige occupations (Miller & Cummings, 2009; Emmett & Minor, 1993) reflect an unintended consequence, or a by-product, of the pursuit of occupations that are intellectual stimulating.

In terms of implications for practice, a careful examination of the pathways in the model may enable psychologists, counsellors, educators, policymakers parents, and guardians

to gain a better and a clearer understanding of how specifically highly able adolescents may make their career decisions. Simultaneously, the model may be useful as a framework for assisting adolescents who may be having some difficulty in arriving at a decision about their future careers, and young adolescents who may be in the initial stages of thinking about their future careers. For example, reflecting the pivotal and intermediary role of interest/enjoyment and attitudes toward occupations in the model, the focus of any career guidance or counselling sessions may need to be on the types of activities or occupations that these adolescents may consider to be interesting or enjoyable, and the types of attitudes that they may hold of different occupations. As the model suggests that intellectual stimulation is strongly linked to interest and enjoyment in occupations, intellectually stimulating activities and occupations could become a point of discussion in these sessions. Generally, it may be less useful to devote time to discussions of occupations that may be financially rewarding, or occupations that may allow recognition from other members of society. Moreover, any attention to the need to fulfil one's potential may possibly be *distracting* for high ability adolescents.

The model may also prove to be useful in situations where psychologists, counsellors, educators, policymakers, parents, and guardians wish to persuade high ability adolescents to pursue certain "desirable" occupations, or a certain "desirable" category of occupations. For example, policymakers may wish to encourage the pursuit of occupational fields that are experiencing difficulty in attracting qualified candidates, while many parents and guardians may wish to promote the pursuit of professional or skilled occupations that optimally utilizes the capabilities of their children. To this end, the model suggests that as an initial step, it may be useful to make an assessment of the cultural orientations of the adolescents, to determine a possible role for family members. If a high ability adolescent has a collectivist orientation toward the family, family members may prove to be quite influential in the eventual

occupational decisions that are made. Thereafter, the interesting, enjoyable, and the intellectually stimulating aspects of the "desirable" occupations could be highlighted.

Cognitive processes associated with career indecision

The finally accepted model of the cognitive decision-making processes associated with occupational/career indecision also provided a number of useful insights. Generally, the main paths in the model suggested that adolescents of high intellectual ability without social influences from the family, or an individualistic outlook toward the future, are likely to become amotivated about their future occupations or careers, and eventually, experience occupational/career indecision.

The major mediating constructs in the model appeared to be social influences from the family and occupational amotivation (as social influences from the family was predicted by both of the cultural orientation constructs that were acknowledged in the study, while occupational amotivation was predicted by social influences from the family and idiocentrism-future, and was a predictor of occupational indecision). Both constructs indeed appear to play important roles in determining whether an adolescent of high intellectual ability may become undecided about their future occupation or career. Nevertheless, the strength of the relationship between occupational amotivation and occupational indecision, and the lack of any other *direct* predictors of occupational indecision is suggestive of the greater, and possibly pivotal, function of occupational amotivation in predicting occupational indecision among intellectually gifted adolescents. Further investigations may be necessary to evaluate whether the nature of the relationship between the two constructs may go beyond a predictive relationship, such that occupational amotivation may be considered a precursor to, or a prototype of, occupational indecision.

Many of the relationships in the model were consistent with expectations. Nevertheless, some of the relationships proposed in the theoretical frameworks were not supported. First of

all, no statistically significant relationships were found to exist between perfectionism, multipotentiality, and the remaining factors in the model. The fact that these factors formed part of empirically verified models in the first phase of the study, but not in the second phase, suggested that any contribution of perfectionism and multipotentiality to occupational amotivation or occupational indecision, if meaningful, may be somewhat weak. The study findings suggested that perfectionism may not be pervasive enough as a characteristic of intellectually gifted adolescents to form a stable element of a model of their occupational/career decision-making processes. Moreover, the association between multipotentiality and the other elements of the model appeared not to be strong or direct enough to justify the formation of any statistically significant relationships.

The lack of a statistically significant relationship between the social influences of the family and occupational indecision (in contrast to the existence of a statistically significant relationship between social influences of the family and occupational amotivation) was a very noteworthy aspect of the model. One interpretation of the result is that the development of different forms of motivation under self-determination theory (i.e., intrinsic motivation, extrinsic motivation, and amotivation; Deci & Ryan, 1985; Ryan & Deci, 2000) with respect to the occupational/career decision may be considered to be more malleable, open, and receptive to the influence of others, than occupational/career decision itself. It is possible that the state of decidedness about one's future occupation or career may instead be viewed as a *personal* issue by intellectually gifted adolescents, which may be resistant to the influence of others.

In terms of implications for practice, the model provides a basis and a framework for understanding, and providing assistance to, intellectually gifted adolescents who may be experiencing some difficulty with the occupational decision. A particularly useful aspect of the model is that it provides some direction on the areas for potential focus (i.e., the degree to

which the adolescent may be amotivated about the occupational decision, the existence or otherwise of family support, cultural orientations such as whether one has an individualistic outlook with respect to the future, and the degree to which the adolescent may be occupationally undecided) as well as areas that may require *less* attention (i.e., multipotentiality and perfectionism). As such, it may be advisable for psychologists, career counselors, and families to make assessments of at least some of the most important of these variables, possibly by utilising the psychometrically rigorous scales that have been used in the present study, or adaptations of these scales. If found to be effective and appropriate, these assessments may be regularly incorporated into the protocols and procedures used to support the career decisions of intellectually gifted adolescents.

The model additionally provides a number of practical guidelines and strategies that may be useful to direct adolescents of high intellectual ability away from being undecided about their future occupations or careers. If an assessment of the occupational amotivation of intellectually gifted adolescents indicates abnormally high levels, it may be necessary to encourage the development of the other forms of motivation under self-determination theory. For example, the interesting, enjoyable and satisfying aspects of starting a career (i.e., intrinsic motivation), or the possible financial and social rewards of work (i.e., extrinsic motivation), could be highlighted. Reflecting the negative relationship between social influences from the family and occupational amotivation in the model, the families of intellectually gifted adolescents may have a particularly important role to play in this regard. The influence of the family is likely to be important irrespective of whether the adolescents have individualistic orientations toward the future or collectivistic orientations toward the family. Nevertheless, any attempts by family members directly address occupational indecision may not be particularly useful, reflecting the non-significance of the relationship between social influence-family and occupational indecision in the model.

If the support of the family is not available, an alternative approach to direct intellectually gifted adolescents away from occupational indecision may be to encourage an independent outlook with respect to the future (reflecting the negative relationship between idiocentrism-future and occupational amotivation in the finally accepted model). Perhaps case studies may be shown of intellectually gifted adolescents with individualistic future orientations moving onto successful careers, or the affected adolescents may be encouraged to enrol in schools that promote an ethos of taking control of one's future. Alternatively, it may be useful to identify parties who may play a significant part of the lives of these adolescents, for training, to communicate appropriate career-related messages in lieu of family members.

Future research

The study has a number of implications for future research. First, it may be useful to compare the finally accepted models, and assess their stability, with intellectually gifted adolescents from cultures that are dissimilar to those tested in this study, and intellectually gifted adolescents from rural backgrounds. Secondly, future investigations could re-test the models for greater clarity on the role occupational income, recognition from others, multipotentiality, and perfectionism on the career decision-making processes of high ability adolescents, as all of these variables were identified to be salient in the first phase of the study. Third, it may be worthwhile to incorporate, and verify the relevance of, dimensions of culture that were not examined in this study (e.g., power distance, masculinity/femininity, and uncertainty avoidance; Hofstede, 2001), and other possibly relevant factors (e.g., a superior access to career-related information; Greene, 2003; Kelly & Cobb, 1991), to gain a more complete understanding of the career decision-making processes of intellectually gifted adolescents. Finally, to assess whether the formation of intentions to pursue certain occupations or careers will actually translate into entry into these occupations or careers, one

other potential area of inquiry may be in the eventual career destinations of highly able adolescents.

Limitations

The study has a number of limitations that need to be acknowledged. First, it is noted that the findings reflect the analysis of self-reported survey data that was not triangulated using other data sources, such as data from others who may have knowledge about the career decision-making processes of the research participants, documentary evidence of reported claims, or other data types that are collectable using alternative research instruments. Second, the paths in the finally accepted models may not be definitively described as being causal in nature, as the conditions for establishing causality (e.g., Hair et al., 2010) were not necessarily met. Third, it is not possible to claim that *every* factor relating to the career decision-making processes of intellectually gifted adolescents were incorporated into the theoretical frameworks that were tested and guided the study. Finally, it is noted that the finally accepted models were two of a number of possible models of the career decision-making processes of intellectually gifted adolescents. Nevertheless, these models were based on a thorough and rigorous examination of the literature.

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